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is regarded as 'a quantity which becomes indefinitely small.' According to the definition of limit, page 3, either of two *variables*, as  $\frac{1}{2^n}$ ,  $\frac{1}{3^n}$ ,  $n$  increasing, may be the limit of the other. On page 10 we are told that when a point, moving continuously on a given curve, passes a specified point of the latter, it tends at that instant to move on the tangent. There is, of course, no such tendency, and continuity is not defined till several pages later. On page 25 the conclusion, 'Hence the first derivative, etc.,' is, as stated, entirely unwarranted by the premises. 'Any finite constant' is much too sweeping. It appears to be assumed throughout that continuity implies derivability. The explanations of the differentials  $dy$  and  $dx$ , pp. 39, 40, are interesting and curious. It would be supererogatory to give here an exhaustive enumeration of the peculiarities encountered, the foregoing specimens, taken at random, being perhaps sufficient.

The final three chapters present plainly and pleasantly an introduction to the practical phase of differential equations. The existence theorem, naturally not proved, is however *tacitly* assumed, and such fundamental questions as whether all modes and orders of elimination lead to the same equation are neither met nor propounded.

Dr. Murray's book is a simple, fresh, luminous and suggestive presentation of the elementary subject-matter of the integral calculus. While it was written primarily for engineering classes and particularly adapted to conditions prevailing at Cornell University, still the needs of others have been regarded and the work is not ill-suited as a guide to any one beginning the study of this branch of mathematics. The first two chapters, in particular, furnish an unusually full account of fundamental concepts and operations. The two conceptions of integration, as the inverse of differentiation, and as a process of summation, are shown to be one. On pages 9 and 11 and elsewhere, the symbol  $\int$  is spoken of as denoting now a sum and again the limit of a sum, with seeming indifference.

Chapter XII. deals briefly with the important subject of integral curves, and in the next

chapter, which is final, we find a brief discussion of some common and important differential equations.

For the convenience of any who may not have the time—several months, at least—necessary for the mastery of all the matter offered, a list of lessons for a shorter course is suggested. Many other minor features help to enhance the acceptability of the book. The exercises are numerous and many of them are not found in other works. A table of answers is appended as also a short table of integrals. Binding and paper are substantial and printing and proof-reading well done. There is no great pretense of rigor but there is life. The book was not stillborn.

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#### GENERAL.

THE Adjutant-General's office of the War Department has undertaken the issue of a 'French-English Military Technical Dictionary,' compiled by Cornélis De Witt Willcox, first lieutenant of artillery, U. S. Army. The first part, which has just been issued, contains 160 pages and reaches the word *espace*. The book is clearly printed with a judicious use of block and italic type. It will prove useful not only in the army and navy, but also to students of science in different directions. Many of the words translated will not be found in a good French dictionary as 'Littré et Beaujean,' yet they occur in scientific books. Not many Americans could give the equivalent of words such as *abouement*, *abougri*, *abraquer*, etc., and it is convenient to have at hand a dictionary in which they can be found. It is a matter for congratulation that there are in the army officers capable of such good scientific and literary work, and that it is encouraged by the authorities.

THE Experiment station of West Virginia University has recently issued Bulletin, No. 56, prepared by Dr. Hopkins, summing up the work done by him as entomologist of the Station during the past eight or nine years. This is a large bulletin of over 360 pages, and contains much valuable data collected by the entomological department during the time named, as it

gives the results of investigations, both in this country and Europe, relative to the spruce and pine interests, and the insects predaceous and beneficial to them.

MESSRS D. APPLETON & Co. announce the following new volumes in their library of 'Useful Stories': 'The Living Machine,' by Professor H. W. Conn; 'The Alphabet,' by Edward Clodd and 'Organic Chemistry,' by Professor G. F. Chambers.

THE continuation of several important publications by The Macmillan Company, namely the second volume of the 'Scientific Papers,' by John Couch Adam; the third volume of the text-books of 'Embryology of Invertebrates,' by Drs. E. Korschelt, K. Heider, and the second part of the translation of Professor Van Zittel's text-book of paleontology.

#### BOOKS RECEIVED.

*Liquefaction of Gases.* WILLET L. HARDIN, New York and London. 1899. Pp. viii + 250. \$1.50.

*The Kinetic Theory of Gases.* H. S. BURBURY, Cambridge. At the University Press. 1899. Pp. viii + 157.

*The History of the European Fauna.* R. F. SCHARFF, London, Walter Scott, Ltd. 1899. Pp. 364.

*Untersuchungen über die Vermehrung der Laubmoose durch Brutorgane und Stecklinge.* CARL CORRENS, Jena, Fisher. 1899. Pp. xxiv + 472. 15 Marks.

*Annuario publicado pelo observatorio do Reio de Janeiro, 1899.* Rio de Janeiro. L. MALAFIA, JR. 1899. Pp. x + 318.

*Das Tierreich.* 5 Lieferung, *Sporozoa.* ALPHONSE LABBÉ. Berlin, Friedländer. 1899. Pp. xx + 180. Subscription price, 8.80 Mark. Single 12 Mark.

*Catalogus Mammalium tam Ovientum quam fossilium.* E. L. TROUESSART. Fasciculus VI. Index, alphabeticus, Berolini, Friedländer. 1899. Pp. 1265-1469.

*Electric Motive Power.* ALBION T. SNELL. New York, D. Van Nostrand; London, The Electrician Printing and Publishing Co., Ltd. 2d Edition. Pp. vi + 403. \$5.00.

*Methods of Knowledge.* WALTER SMITH, New York and London, The Macmillan Company. 1899. Pp. xxii + 340.

*Hand-book of Optics.* WILLIAM NORWOOD SUTER, New York and London, The Macmillan Company. 1899. Pp. viii + 209. \$1.00.

*Inorganic Chemical Preparations.* FELIX LENGFELD. New York, The Macmillan Company. 1899. Pp. xviii + 55.

*Naturae Novitates.* Berlin, Friedländer. 1898. Pp. 780. 4 Mark.

*The University Geological Survey of Kansas, Vol. V.* Special Report on Gypsum and Gypsum Cement Plasters. G. P. GRIMSLEY and E. H. S. BAILEY, Topeka, J. S. Park. 1899. Pp. 83.

*Mineral Resources of Kansas.* ERASMIUS HAWORTH, Lawrence, University of Kansas. 1899. Pp. 128.

*Sextus Empiricus and Greek Scepticism.* MARY MILLS PATRICK. Cambridge, Deighton, Bell & Co.; London, George Bell & Sons. 1899. Pp. viii + 163.

#### SCIENTIFIC JOURNALS AND ARTICLES.

*American Chemical Journal,* August. 'On Nitromalonic Aldehyde': By H. B. Hill and J. Torrey, Jr. 'Contributions to the Study of Aqueous Solutions of Double Salts': By H. C. Jones and N. Knight. The evidence is in favor of the view that the double chlorides exist as such in concentrated solutions and are only dissociated at great dilution. 'On the Rearrangement of the Thiocarbamic Esters': By H. L. Wheeler and B. Barnes. 'Dimethyl-dianthracene, A Polymeric Modification of  $\beta$ -Methylanthracene': By W. R. Orndorff and H. A. Megraw. 'The Action of Chromic Acid on Hydrogen': By C. L. Reese. Experiments carried out under various conditions and temperatures showed that hydrogen is oxidized only very slightly, if at all, below a temperature of 100°. 'Action of Sulphuric Acid on Nitroheptane': By R. A. Worstell.

J. E. G.

*THE National Geographical Magazine* for September contains the following articles:

The Commercial Development of Japan, by O. P. Austin.

Bad Lands of South Dakota, by N. H. Darton.

The West Indian Hurricane of August 7-14, 1899, by E. B. Garriott.

The Return of Wellman, by J. Howard Gore.

The International Cloud Work of the Weather Bureau, by Frank H. Bigelow.

The number also contains several shorter articles, as 'The Rediscovery of Porto Rico,' 'Through Franz Josef Land,' and 'The Isthmian Canal Route,' besides a good deal of geographic miscellanea.